APPENDIX C

SCOPE OF WORK FOR COMPLETION OF THE REMEDIAL ACTION AT THE VERONA WELL FIELD SUPERFUND SITE

I. PURPOSE

The purpose of this Scope of Work (SOW) is to set forth the remaining tasks required to implement certain remedial actions for the Verona Well Field site pursuant to the Consent Decree to which this SOW is attached.

This SOW outlines the requirements and schedule for the design, construction, operation, maintenance, monitoring, and project completion procedures needed to implement the following remedial actions as required in the Record of Decision (ROD) issued June 28, 1991, as revised by the Explanation of Significant Differences (ESD) issued on September 29, 2003.

- a dual blocking well system to protect the City of Battle Creek (City) water supply and clean up the aquifer upgradient from the City well field and downgradient from the three source areas: Thomas Solvent Raymond Road, the Thomas Solvent Annex (Annex), and the Grand Trunk Western Railroad Paint Shop (Paint Shop);
- cleanup of soil at the Annex and Paint Shop source areas; and
- containment and cleanup of groundwater at the Annex and Paint Shop source areas.

In general this SOW requires:

- continued operation, maintenance and monitoring of the dual blocking well lines, the Annex and Paint Shop groundwater extraction systems, and the treatment system;
- upgrading the Annex and Paint Shop groundwater extraction systems to assure that contaminated source area groundwater is captured;
- taking measures to assure that the force main from the Annex to the Verona Well Field treatment plant does not leak into the storm sewer;
- well abandonment; and
- performance of the final soil verification sampling at the Annex and Paint Shop, and further treatment of source area soils, if necessary.

II. TASKS COMPLETED

Under two Unilateral Administrative Orders ("UAOs") issued on February 19, 1992, and May 5, 1992, EPA has approved the following documents prepared by the Settling Defendants as part of implementation of the remedial actions:

- Health and Safety Plan. Geraghty & Miller, Inc. May 27, 1993 (superseded);
- SVE Systems Final Design Report, Verona Well Field Superfund Site. Geraghty & Miller, Inc. (Geraghty & Miller). June 3, 1993;
- Draft Final Remedial Design/Remedial Action Work Plans. Geraghty & Miller.
 August 13, 1993, as revised by December 20, 1993 letter from Geraghty & Miller (superseded);
- Quality Assurance Project Plan For Remedial Design/Remedial Action Activities.
 Geraghty & Miller. October 1993 revision (superseded);
- Final RD/RA Design Report, Verona Well Field Site. Maumee Bay Environmental, Inc. September 26, 1994;
- Final Groundwater and Air Monitoring Plan for the Remedial Action System at the Verona Well Field. Geraghty & Miller. June 20, 1996 (superseded);
- Operation and Maintenance Manual Verona Well Field Remedial Action.
 Geraghty & Miller. June 1997, as amended by October 1998 revision (superseded);
- Operation and Maintenance Manual, Verona Well Field (OMM). Progressive Engineering and Construction, Inc. (Progressive). January 2000;
- Well Maintenance and Discharge of Cleaning Fluids. Progressive. July 31, 2000 (superseded);
- Draft Work Plan for RA and Source Area Enhancement Simulations.
 Progressive. November 9, 2000;
- Final Scope of Work for New Annex Monitoring Wells. Progressive. December 1, 2000;
- Final Soil Cleanup Verification Sampling Plan, Verona Well Field Remedial Action. Progressive. January 2001 revision;
- Scope of Work for Annex Upgrades for Phase 1 at the Verona Well Field Project. Progressive. June 13, 2001;
- Summary Scope of Work for Activities in May 2002. Progressive. April 29, 2002;
- Final Metals Background Study Scope of Work. Progressive. June 17, 2002;
- Summary Scope of Work for Activities in July 2002 Annex. Progressive. July 8, 2002;
- Summary of Proposed Layout for Enhanced System Bypass Piping. Progressive. November 1, 2002;
- Final Contingency Plan for the Enhanced System and Annex Upgrades.
 Progressive. November 21, 2002;
- Enhanced System Bypass Piping Design Build Document Final. Progressive.
 March 13, 2003, as supplemented by a letter from Progressive dated March 13, 2003 and a discussion between EPA and Progressive on April 22, 2003;
- Construction Quality Assurance Plan Enhanced System Bypass Piping.
 Progressive. April 23, 2003;
- Annex Recovery System Upgrades Design Build Document Final. Progressive.
 June 20, 2003;
- Annex Construction Schedule and Initial Hydraulic Monitoring Scope of Work.
 Progressive. August 26, 2003, as revised by September 12, 2003 EPA letter;

- Enhanced System Hydraulic Monitoring Study and Scope of Work for Installation of BW9 and Well Field Piezometers. Progressive. August 29, 2003, as revised by September 12, 2003 EPA letter;
- Health and Safety Plan. Progressive. October 24, 2003;
- Quality Assurance Project Plan (QAPP). Progressive. December 2003;
- Ground Water Monitoring Plan (GWMP). Progressive. December 17, 2002 as updated on February 10, 2004 (attached); and
- Enhanced System Design Build Document. Progressive. December 15, 2003.

Under the UAOs, the following remedial actions have been conducted by the Settling Defendants with oversight by EPA:

- In 1993, construction of SVE systems at the Annex and at the Paint Shop, and operation of these systems from June 1993 through June 1994;
- From June 30, 1996 through December 1996, operation of the original (northern) blocking well line and groundwater treatment system;
- From August through December 1996, construction of the Annex and Paint Shop ground water extraction systems, construction of the second (southern) blocking well line, and upgrading the northern blocking wells and the treatment system to produce the presently operating, dual blocking well and Annex and Paint Shop pump and treat system (this construction was approved by EPA in a Preliminary Closeout Report dated June 1997);
- In May 2003, construction and initiation of operation of bypass of wet well for northern blocking wells, and other design changes;
- In July September 2003, construction and initiation of operation of the Annex Recovery System Upgrades;
- In September-October 2003, construction of BW9 and piezometers in the well field; and
- Starting in November 2003, implementation of routine monitoring, testing and data evaluation to detect leaks in the pipeline from the Annex to the Verona Well Field air stripper, in accordance with *Leak Detection/Corrective Action Process* for the Annex Header, Progressive, November 14, 2003.

Under the UAOs, the following monitoring and sampling has been completed by the Settling Defendants with oversight by EPA:

- In 1993, soil sampling at the Annex and Paint Shop during SVE systems installation;
- In 1996, preliminary soil sampling at the Annex;
- From 1996 through 2003, groundwater quality and hydraulic monitoring for the entire system;
- In 1999, aquifer rebound study (and river leakage study/dye tracer study/fracture mapping by USGS);
- In 2000, selected soil borings sampling at the Paint Shop;
- In 2000-2003, installation of additional monitoring wells at the Annex and Paint Shop source areas and in the well field and conversion of the four sentinel wells,

- which were open to the entire upper and lower Marshall sandstone aquifers, to wells screened at certain fractures in the upper and lower sandstone aquifers;
- In 2002, groundwater monitoring for metals and SVOCs (baseline and background study) for the source areas;
- In 2002-2003, aquifer hydraulic testing at the Annex using shallow extraction wells and additional shallow piezometers;
- In September December 2003, start-up and first quarter of water level monitoring to evaluate hydraulic containment at the Annex using the upgraded Annex pump-and-treat system;
- On October 2003, initial hydraulic monitoring to characterize the baseline potentiometric surface prior to initiation of operation of BW-9 to capture Paint Shop groundwater.

The results of construction, sampling and operations under the UAOs are documented in the following reports prepared by the Settling Defendants and accepted by EPA:

- Monthly Progress Reports. Geraghty & Miller, Arcadis Geraghty & Miller (Arcadis), and Progressive. 1992 – present;
- Annex and Paint Shop SVE Systems Monthly and Quarterly Operating Reports.
 Geraghty & Miller. July 1993 May 1995;
- SVE Construction Completion Report Verona Well Field Superfund Site.
 Geraghty & Miller. June 28, 1994;
- Letter regarding residual disposal procedure. Geraghty & Miller, Inc. September 9, 1996;
- Remedial Action Construction Completion Report Verona Well Field Superfund Site. Geraghty & Miller. June 1997;
- Monitoring Report for the First Quarter of Operation Verona Well Field Remedial Action. Geraghty & Miller. July 1997 revision;
- 1997 Annual Monitoring Report. Geraghty & Miller. March 1998;
- 1998 Annual Monitoring Report. Arcadis. March 1999;
- Results of Packer vs. Non-Packer Testing at Sentinel Wells Verona Project. Arcadis. April 23, 1999;
- Summary of 1999 Activities. Arcadis. September 14, 1999;
- Summary Report for December 1999 Additional Shallow Investigation, Verona Project. Progressive. January 17, 2000;
- Comprehensive Summary Report of 1999 Activities. Progressive. January 18, 2000;
- 1999 Annual Monitoring Report. Progressive. February 2000;
- Memorandum transmitting Soil Quality Documentation, Verona Well Field Site.
 Progressive. February 24, 2000;
- Summary of VWF Model Recalibration and Refinement. Progressive and Arcadis, September 19, 2000; and Supplemental Information, November 6, 2000;
- Well Survey Update January 2001. Progressive. January 29, 2001;
- 2000 Annual Monitoring Report. Progressive. February 2001;
- Summary Monitoring Well Installation Annex. Progressive. February 7, 2001;

- Summary of Biased Soil Borings Paint Shop. Progressive. February 8, 2001;
- Summary of RA Enhancement Simulations for the Verona Well Field Project.
 Progressive. March 26, 2001;
- Decommissioning of Vapor Phase Treatment System. Progressive. August 2, 2001;
- Compilation of Various Access Agreements and Easements for Work at the VWF Site. Letter from Craig Hupp of Bodeman, Longley and Dahling, LLP. January 29, 2002;
- 2001 Annual Monitoring Report. Progressive. February 2002;
- Summary of May 2002 Field Activities. Progressive. June 4, 2002;
- Summary of 2002 Aquifer Testing at the Annex and Paint Shop Source Area.
 Progressive. September 30, 2002;
- Request for Variance from Compliance with 40 CFR 264.193 for Annex Pipeline.
 Progressive. November 5, 2002;
- Addendum to Request for Variance (dated 11/5/02) from Compliance With 40
 CFR 264.193 for the Annex Pipeline. Progressive. November 25, 2002;
- 2002 Annual Monitoring Report. Progressive. February 20, 2003;
- Source Area Groundwater and SVOCs Assessment Summary Report.
 Progressive. May 23, 2003;
- Summary of Piping Pressure Testing during Enhanced System Bypass Construction. Progressive. July 22, 2003;
- Additional Information in Support of the Request for Variance from Compliance with 40 CFR 264.193 for the Annex Pipeline. Progressive. September 22, 2003;
- Initial WL Data Evaluation for Annex Upgrades Startup, Progressive, September 22, 2003; and
- Summary of Installation of BW9 and Piezometers 1,2, and 5 and Start of 1 Year
 Hydraulic Monitoring Study. Progressive. October 20, 2003.

III. TASKS REQUIRED UNDER THIS SOW TO COMPLETE THE REMEDIAL ACTIONS

The Settling Defendants shall undertake the following actions. These actions must be in accordance with the ROD, including all amendments and ESDs.

- A. <u>Continued Operation</u>, <u>Maintenance and Monitoring</u>: The Settling Defendants shall continue to implement the Work as defined in the Consent Decree and this SOW in accordance with EPA-approved documents. The Settling Defendants shall operate and maintain the Annex and Paint Shop groundwater extraction systems and the dual blocking well lines in accordance with the EPA-approved OMM. The Settling Defendants shall monitor groundwater in accordance with the following approved documents:
 - the GWMP;
 - the QAPP:

- Enhanced System Hydraulic Monitoring Study and Scope of Work for Installation of BW9 and Well Field Piezometers as revised by a September 12, 2003 EPA letter:
- Annex Construction Schedule and Initial Hydraulic Monitoring Scope of Work as revised by a September 12, 2003 EPA letter; and
- Contingency Plan for the Enhanced System and Annex Upgrades, Progressive, November 21, 2003.

These documents shall be updated from time to time as necessary to meet the objectives of the ROD, and to comply with applicable Federal, State and Local requirements. The *Health and Safety Plan* shall apply to all site activities in which there is a reasonable probability of exposure to hazardous substances.

The Settling Defendants shall continue to restrict access to the areas where equipment is used for remediation of soil or groundwater, and to areas of soil contamination. At a minimum, access shall be restricted using a six-foot high, chain link fence with three-strand barbed wire. The fence must have gates large enough to allow for access by large machinery and trucks. Warning signs shall be posted at every gate and at 200 foot intervals along the fence where the gate or fence borders areas accessible to the public.

The Settling Defendants shall summarize and present to EPA the results of the hydraulic and contaminant groundwater monitoring for each year in an annual monitoring report. The Settling Defendants shall submit each annual monitoring report to EPA by February 15 of the following year. Each annual monitoring report shall include:

- a summary of new construction completed, including additional monitoring wells;
- an operational summary, including major maintenance activities, a summary of down-times, description of all significant operational problems, contingency measures implemented, and adjustments made in response to changes in City water pumping rates;
- a summary of monthly City water pumping rates and the City's prediction of nextyear's City water pumping rates;
- a tabulation of all hydraulic and groundwater quality data;
- a comparison of the groundwater quality data to groundwater cleanup objectives (CUOs--the presently effective groundwater CUOs are in Table 1 of the ESD;
- an interpretation of hydraulic data including potentiometric surface maps;
- figures to display trends in contaminant data;
- a memorandum describing data validation results;
- a summary of other data not previously submitted in monthly progress reports;
 and
- a summary of proposed new construction and changes in operation and monitoring.

B. <u>Achieving Groundwater Capture at the Annex</u>: The Settling Defendants shall upgrade the Annex groundwater extraction system to assure that source area ground water is contained. In September 2003, the Settling Defendants completed construction and initiated operation of upgrades to the Annex groundwater extraction system, and commenced hydraulic monitoring.

The hydraulic monitoring is being conducted in accordance with the *Annex Upgrades Construction Schedule and Initial Hydraulic Monitoring Scope of Work* (as revised by a September 12, 2003 EPA letter). The Settling Defendants shall complete this hydraulic monitoring, and incorporate the data as well as a capture zone evaluation for the Annex in the 2004 Annual Monitoring Report. EPA shall review the capture zone evaluation and determine whether the contaminated groundwater in the Annex source area is being contained. The Settling Defendants shall document construction of the upgrades to the Annex groundwater extraction system in a *Construction Completion Report*¹, and updates to the operation and maintenance procedures in an updated OMM, both of which shall be submitted within 12 weeks of completion of construction activities for the Annex upgrades and for BW-9.

If EPA determines that the upgraded Annex groundwater extraction system does not adequately capture contaminated groundwater from the Annex source area, then within 60 days of receipt of EPA's determination, the Settling Defendants shall submit a revised Work Plan (see Section VI of the Consent Decree) to EPA, including a schedule, for design and construction of further upgrades to the Annex groundwater extraction system that are necessary to achieve groundwater capture at the Annex. The Settling Defendants shall implement the tasks identified in the revised Work Plan as approved by EPA.

C. Measures to Assure that the Force main from the Annex to the Verona Well Field Treatment Plant Does Not Leak into the Storm Sewer: The Settling Defendants shall assure that the force main from the Annex to the Verona Well Field treatment plant does not leak untreated Annex groundwater into the storm sewer by implementing measures to comply with the substantive requirements of 40 CFR § 265.193, which EPA has determined is a relevant and appropriate requirement (see 2003 ESD). EPA, with technical support from MDEQ, is evaluating whether the force main, as presently constructed, operated, maintained and monitored, satisfies the substantive requirements for a variance pursuant to 40 CFR § 265.193(g) for piping untreated Annex groundwater to the Verona Well Field treatment plant.

¹ The Construction Completion Report shall include as-built drawings, a step-by-step summary and chronology of the construction activities including problems encountered, documentation that the approved construction quality assurance/quality control measures were implemented, a summary of the results of the pre-final and final inspections, and identification of any deviations from approved plans including the HSP.

If the State or EPA determines that the Annex force main does not presently meet the substantive requirements for a variance, then within 60 days of receipt of the State's or EPA's determination, the Settling Defendants shall submit a revised Work Plan to EPA, including a schedule to either: 1. construct and operate a separate treatment system for the Annex groundwater so that the requirements of 40 CFR § 265.193 will no longer be relevant and appropriate; or 2. implement changes to the design, operation, maintenance and/or monitoring of the Annex force main that are needed to comply with the substantive requirements of 40 CFR § 265.193. The Settling Defendants shall implement the tasks identified in the approved Work Plan as approved by EPA.

D. Achieving Groundwater Capture at the Paint Shop: The Settling Defendants shall upgrade the Paint Shop groundwater extraction system to assure that source area ground water is contained. In October 2003, the Settling Defendants completed installation of BW9 to better contain Paint Shop groundwater, and well field piezometers to better monitor this containment, and initiated baseline hydraulic monitoring as provided for in the *Updated Enhanced System Hydraulic Monitoring Study and Scope of Work*, which requires hydraulic monitoring for a period of six months before and six months after initiation of operation of BW9.

To complete implementation of measures to contain the Paint Shop groundwater, the Settling Defendants shall:

- submit a final *Design/Build Document* for upgrades to the blocking well system, including connection of BW9 to the southern blocking well line and operation of BW9, within 60 calendar days from receipt of EPA comments;
- initiate construction of the upgraded blocking well system, which will include connection of BW9 to the southern blocking wells, within 17 weeks of receipt of EPA and Michigan Department of Environmental Quality (MDEQ) approval or approval with modifications of the final *Design/Build Document*;
- complete construction and initiate operation of BW9 within 38 weeks of receipt of EPA and MDEQ approval or approval with modifications of the final *Design/Build Document*;
- conduct a prefinal inspection with EPA within one week of completion of construction:
- address punch list items identified by EPA as a result of the prefinal inspection and conduct final inspection with EPA within 4 weeks after receipt of punch list items from EPA;
- perform hydraulic monitoring in accordance with the Updated Enhanced System
 Hydraulic Monitoring Study and Scope of Work for Installation of BW9 and Well
 Field Piezometers, as revised by September 12, 2003 EPA letter;
- evaluate the hydraulic monitoring data and incorporate the results including a capture zone evaluation for the Paint Shop in the 2005 Annual Monitoring Report; and
- submit a Construction Completion Report (see Footnote 1 supra) to document construction, and an updated OMM to update operation and maintenance

procedures within 12 weeks of completion of construction activities for the Annex upgrades and for BW9.

If EPA determines that the upgraded Paint Shop/dual blocking well pump-and-treat system does not adequately capture contaminated groundwater from the Paint Shop source area, then within 60 days of receipt of EPA's determination, the Settling Defendants shall submit a revised Work Plan to EPA including a schedule for design and construction of further upgrades to the system that are necessary to achieve groundwater capture at the Paint Shop. The Settling Defendants shall implement the tasks identified in the Work Plan as approved by EPA.

E. <u>Well Abandonment</u>: The Settling Defendants shall properly abandon unneeded monitoring wells. To accomplish this, the Settling Defendants shall:

- submit a Well Abandonment Plan to EPA and MDEQ including a schedule within 12 weeks of entry of the Consent Decree (a Draft Well Abandonment Plan dated 9/24/03 has already been submitted to EPA and MDEQ); and.
- implement tasks identified in the Well Abandonment Plan as approved by EPA.

F. <u>Soil Cleanup Verification</u>, <u>Response</u>, <u>Demolition</u>, <u>and Close-Out</u>: The Settling Defendants shall document achievement of the soil cleanup objectives (the presently effective soil cleanup objectives are listed in Table 1 of the ESD), reactivate and operate the soil vapor extraction treatment systems if necessary to complete soil treatment and achieve the soil cleanup objectives, and demolish facilities for soil treatment for Annex and/or Paint Shop source area soils after the soil cleanup objectives are achieved. To accomplish this, the Settling Defendants shall:

- conduct soil sampling and submit to EPA the Soil Cleanup Verification Report² in accordance with the approved Final Soil Cleanup Verification Sampling Plan within 3 years of the date of entry of the Consent Decree or such other date as approved by EPA;
- submit a Soil Remedial Action Report³ for the Annex and/or Paint Shop, if the Settling Defendants believe and EPA concurs that the Soil Cleanup Verification Report provides sufficient documentation that the soil cleanup objectives have been achieved, within 60 days of receipt of a written notification that EPA concurs that the soil cleanup objectives have been achieved;

² In addition to the contents provided for in the *Final Soil Verification Sampling Plan*, if the soil cleanup objectives are not achieved at the Annex and/or Paint Shop, the *Soil Cleanup Verification Report* must include a plan and schedule for reactivation and operation of the soil vapor extraction system for the relevant source area so that the soil cleanup objectives will be achieved. The plan must include additional soil sampling and submission additional reports on the soil sampling to evaluate the progress of the remedy in achieving the soil cleanup objectives.

³ The Remedial Action Report shall document cleanup activities in accordance with Exhibit 2-3, RA Report Contents in Close Out Procedures for National Priorities List Sites, EPA/540/R-98/016, OSWER 9320.2-09, January 2000, and must also include a plan and schedule for demolition of facilities that are no longer needed.

- if EPA does not concur that the Soil Cleanup Verification Report documents that the soil cleanup objectives have been achieved at the Annex and/or Paint Shop, then reactivate the soil vapor extraction treatment at the relevant source area(s), and operate the system(s) until the soil cleanup objectives are achieved, in accordance with the plan and schedule in the Soil Cleanup Verification Report as approved by EPA;
- if a soil vapor extraction system is required to be reactivated, submit to EPA a
 Soil Remedial Action Report for the Annex and/or Paint Shop when the Settling
 Defendants believe that the sampling data indicates that the soil cleanup
 objectives have been achieved;
- shut-down the soil vapor extraction system(s) and implement demolition of the Paint Shop and/or Annex soil treatment facilities in accordance with the Soil Remedial Action Report as approved by EPA.
- G. <u>Groundwater Cleanup Verification</u>, <u>Response</u>, <u>and Completion of Work</u>: The Settling Defendants shall document achievement of groundwater cleanup objectives (the presently effective groundwater cleanup objectives are listed in Table 1 of the ESD) for portions of the aquifer, adjust operation and sampling requirements to accomplish shut-down of unneeded portions of the pump-and-treat system, and demolish unneeded portions of the pump-and-treat facility.⁴ To accomplish this, the Settling Defendants shall:
 - submit to EPA a Proposal for Closure Demonstration Sampling⁵ when the Settling Defendants believe that an extraction or blocking well or a portion of the dual blocking well and Annex and Paint Shop extraction system can be shut down;
 - implement the tasks identified in the Proposal for Closure Demonstration Sampling as approved by EPA;
 - submit to EPA, and to the Michigan Department of Environmental Quality and the City of Battle Creek (if the northern or southern blocking well line is involved), a Groundwater Remedial Action Report (see Footnote 3 supra) and necessary revisions to the GWMP and OMM, when the Settling Defendants believe that the closure demonstration sampling indicates that the relevant extraction or blocking well or portion of the extraction system can be shut down;

⁴ Proposals to adjust or reduce extraction rates or treatment requirements are not addressed in this Section, but instead will be handled as proposed changes to the design plans, OMM, air or water discharge requirements, and/or in routine monitoring reports.

⁵ The *Proposal for Closure Demonstration Sampling* shall require quarterly sampling of the relevant extraction or blocking well or wells and specific up-gradient monitoring wells for a period of one to three years. When the closure relates to part or all of the northern or southern blocking wells, the *Proposal for Closure Demonstration Sampling* shall also be submitted to MDEQ and the City for their approval. All analyses for the closure demonstration sampling shall be validated in accordance with the EPA *Laboratory Data National Functional Guidelines for Organics and Inorganic Analyses* using the Level IV laboratory deliverables as defined in the QAPP.

- in addition to documenting cleanup activities, the Groundwater Remedial Action Report shall document achievement of CUOs using the results of the closure demonstration sampling, and shall include a plan and schedule for demolition of unneeded pump-and-treat facilities, which may include well abandonment;
- implement the demolition, and changes to operation and monitoring in accordance with the *Groundwater Remedial Action Report*, revised OMM, and revised GWMP, all as approved by EPA.



